PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-235378
(43)Date of publication of application : 05.09.1995

(51)Int.Cl. H05B 33/10
G09F 9/30
H05B 33/14

(21)Application number : 06-196057
(22)Date of filing : 27.07.1994

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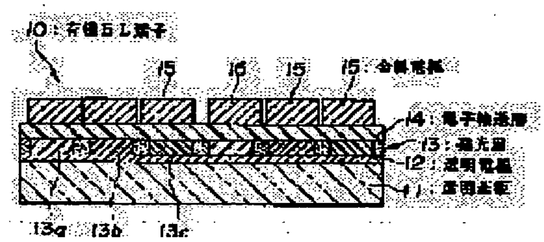
(30)Priority
Priority number : 05352520 Priority date : 28.12.1993 Priority country : JP

(54) ELECTROLUMINESCENT AND ITS MANUFACTURE

(57)Abstract:
PURPOSE: To provide a manufacturing method for electroluminescent element which can select a film material to become a dispersing medium without depending upon the physical properties of the desired fluorescent pigment, perform film formation from the selected material, and can select the fluorescent pigment as desired without being restricted by the physical properties of an electric charge conveying film (layer) to become dispersing medium, and also provide an organic electroluminescent element of matrix display type to be yielded by this manufacturing method.
CONSTITUTION: A hole conveying layer 16, amphoteric conveyance layer to be provided as applicable, and electron conveying layer 14 are formed one over another on the transparent electrode side of a transparent base board 11 having a transparent electrode 12, and further a back electrode 15 to become an electron implantation type electrode is provided so that an intended electroluminescent element is fabricated. After formation of a layer to become an electron/hole recombination region among the conveying layers, fluorescent pigments R, G, B are applied and spread over the recombination region layer, heated, and dispersed in the recombination region layer so that a light emission layer 13 is formed.



LEGAL STATUS

[Date of request for examination] 30.10.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

JP07-235378

CLAIMS

[Claim(s)]
[Claim 1] To the transparent electrode side of the transparence substrate which has a transparent electrode in one field, a hole transportation layer, In the manufacture approach of the electroluminescence devices which carry out sequential formation of the both-sexes transportation layer prepared if needed and the electronic transportation layer, and prepare the back plate used as an electron injection mold electrode on this electronic transportation layer further The manufacture approach of the electroluminescence devices which carry out spreading expansion of the fluorochrome on this recombination field layer after formation of the layer which serves as a recombination field of an electron and a hole among said each transportation layer, and are characterized by heating this fluorochrome subsequently and making it spread in said recombination field layer.
[Claim 2] The manufacture approach of the electroluminescence devices which separate these fluorochromes mutually, carry out spreading expansion on said recombination field layer using two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome in the manufacture approach of electroluminescence devices according to claim 1, and are characterized by heating said recombination field layer subsequently and making coincidence diffuse said fluorochrome in said recombination field layer.
[Claim 3] The manufacture approach of the electroluminescence devices characterized by carrying out sequential diffusion of these fluorochromes into said recombination field layer for every color while carrying out spreading expansion on said recombination field layer using two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome in the manufacture approach of electroluminescence devices according to claim 1 so that these fluorochromes may be mutually separated for every color.
[Claim 4] The matrix electrode which consists of a transparent electrode and a back plate, and the hole transportation layer prepared in the transparent electrode side, Have the electronic transportation layer prepared in the back plate side, and it comes to prepare a both-sexes transportation layer between said hole electronic transportation and an electronic transportation layer if needed further. Electroluminescence devices characterized by making the layer which serves as a recombination field of an electron and a hole among said each transportation layer into the luminous layer a fluorochrome is made to come to spread.
[Claim 5] Electroluminescence devices to which it is made to be spread by the field to which two or more sorts of fluorochromes which said luminous layer presents the different luminescent color in electroluminescence devices according to claim 4 became independent, respectively, and is formed, and the field which these-became independent is characterized by coming to be arranged corresponding to each crossover location of said matrix electrode, respectively.
[Claim 6] Electroluminescence devices according to claim 4 or 5 characterized by using polymer gel as a layer used as the above-mentioned recombination field.
[Claim 7] Electroluminescence devices according to claim 4 or 5 characterized by using porosity silicon as a layer used as the above-mentioned recombination field.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the electroluminescence devices obtained by the manufacture approach of the electroluminescence devices of a charge impregnation mold which used the organic thin film material, and this manufacture approach.
[0002]
[Description of the Prior Art] In recent years, there is an electro RUMINNE sense component (EL element) as electroluminescence devices which the use to a luminescence display, the surface light source, etc. of a display is expected, and are carried out by the part. The thing of the structure shown in drawing 10 as a thing using the organic thin film material especially as such an EL element is known.

[0003] In drawing 10 , a sign 1 is an organic EL device, the transparent electrode 3 which consists of ITO (Indium Tin Oxide) etc. is formed on the transparence substrate 2, the thin film-like luminous layer 4 is formed on this transparent electrode 3, on this luminous layer 4, the thin film-like electronic transportation layer 5 is formed and, as for this organic EL device 1, the back plate 6 which functions as an electron injection electrode on it is formed further.

[0004] It is what a luminous layer 4 functions as a hole transportation layer, and emitter coloring matter (fluorochrome) is made to distribute beforehand by the interior, and emits light. The electron poured in by electric-field impression from the back plate 6 and the hole poured in from the transparent electrode 3 mainly recombine here, an exciton generates by this, this exciton moves further and emitter coloring matter emits light in the color according to the class.

[0005] In addition, the field which an electron and a hole recombine in this way is henceforth called a recombination field layer.

[0006] In order are in charge of manufacturing such an organic EL device 1, especially to form a luminous layer 4, the dispersion-medium film (hole transportation film) which dissolved a dispersion-medium film component and dispersoid coloring matter into the common solvent, applied this solution on the transparent electrode 3 with wet methods, such as a DIP coat and a spin coat, dried after that, and distributed dispersoid coloring matter (fluorochrome) has been obtained. And if it is in the organic EL device 1 obtained by doing in this way, luminescence wavelength can be set as arbitration by the ability distributing the fluorochrome of (1) arbitration.

[0007] (2) Since the common solvent is used, application also of the low ingredient of a film plasticity is attained as a film ingredient for luminous layer formation.

[0008] (3) Defective generating resulting from crystallization of luminescent material at the time of adopting crystalline low things, such as a polymer, as the distributed film can be prevented, and the problem of the life fall which this produces according to defective generating can be solved.

[0009] It is supposed that there is an advantage of **.

[0010] Moreover, if it is in such an organic EL device, since blue luminescence is theoretically easy compared with an inorganic EL element, the application to a RGB individual light emitting device is expected from the time of development.

[0011]

[Problem(s) to be Solved by the Invention] However, although selection of a common solvent becomes more important in luminous layer formation (membrane formation) in the organic EL device shown in drawing 10 since the luminous layer is formed with wet methods, such as a DIP coat and a spin coat, on the occasion of the manufacture In order to have to use as the thin film of hundreds - 1000A of numbers the charge transportation layer which usually consists of an electronic transportation layer, a hole transportation layer, and a both-sexes transportation layer further formed among these if needed in an organic EL device, When the common solvent which fulfills the membrane formation conditions by the wet method in fact is used, the optimal membrane formation conditions cannot necessarily be set up to the ingredient used as the dispersion-medium film, therefore there is un-arranging [that the manufacture is difficult].

[0012] Moreover, in spite of having made the report as [many of] a RGB (red-green blue) individual light emitting device in said organic EL device until now, even if it results in current, there is no report of the organic EL device as multicolor and a full color matrix display device. It is thought that this is the causes with main it being difficult to carry out matrix formation of the organic thin film which constitutes the pixel of each RGB as a pixel pattern on the same substrate with techniques, such as lithography and screen-stencil.

[0013] This invention is what was made in view of said situation. The first purpose The film ingredient which serves as a dispersion medium (dispersion layer), without being dependent on the physical properties of desired distributed coloring matter (fluorochrome) is chosen, and this can be formed further. And it is in offering the electroluminescence devices of the matrix display obtained by the manufacture approach of the electroluminescence devices which can choose a fluorochrome as arbitration, and this manufacture approach, without receiving constraint in the physical

properties of the charge transportation film (charge transportation layer) used as a dispersion medium. Moreover, the second purpose of this invention is to offer the electroluminescence devices of the matrix display obtained by the manufacture approach of of the multicolor or the full color electroluminescence devices which has two or more luminescent color, such as RGB, and this manufacture approach.

[0014]

[Means for Solving the Problem] By the manufacture approach of the electroluminescence devices according to claim 1 in this invention To the transparent electrode side of the transparence substrate which has a transparent electrode in one field, a hole transportation layer, In the manufacture approach of the electroluminescence devices which carry out sequential formation of the both-sexes transportation layer prepared if needed and the electronic transportation layer, and prepare the back plate used as an electron injection mold electrode on this electronic transportation layer further Spreading expansion of the fluorochrome was carried out on this recombination field layer after formation of the layer which serves as a recombination field of an electron and a hole among said each transportation layer, and it made to heat this fluorochrome subsequently and to make it spread in said recombination field layer into the solution means of said technical problem.

[0015] By the manufacture approach of electroluminescence devices according to claim 2, using two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome, these fluorochromes were separated mutually, spreading expansion was carried out on said recombination field layer, and it made to heat said recombination field layer subsequently and to make coincidence diffuse said fluorochrome in said recombination field layer into the solution means of said technical problem.

[0016] By the manufacture approach of electroluminescence devices according to claim 3, while carrying out spreading expansion on said recombination field layer using two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome so that these fluorochromes might be mutually separated for every color, it made to carry out sequential diffusion of these fluorochromes into said recombination field layer for every color into the solution means of said technical problem.

[0017] The matrix electrode which consists of a transparent electrode and a back plate in electroluminescence devices according to claim 4, It has the hole transportation layer prepared in the transparent electrode side, and the electronic transportation layer prepared in the back plate side. The layer which furthermore comes to prepare a both-sexes transportation layer between said hole electronic transportation and an electronic transportation layer if needed, and serves as a recombination field of an electron and a hole among said each transportation layer made it the solution means of said technical problem to have considered as the luminous layer a fluorochrome is made to come to spread.

[0018] In electroluminescence devices according to claim 5, it was made to be spread by the field to which two or more sorts of fluorochromes which said luminous layer presents the different luminescent color became independent, respectively, and was formed, and the field which these became independent made it the solution means of said technical problem to come to be arranged corresponding to each crossover location of said matrix electrode, respectively. In electroluminescence devices according to claim 6, it made to have used polymer gel as a layer used as the above-mentioned recombination field into the solution means of said technical problem. In electroluminescence devices according to claim 7, it made to have used porosity silicon as a layer used as the above-mentioned recombination field into the solution means of said technical problem.

[0019]

[Function] The both-sexes transportation layer which is prepared a hole transportation layer and if needed according to the electroluminescence devices according to claim 1, Since spreading expansion of the fluorochrome is carried out on this recombination field layer after formation of the layer which serves as a recombination field of an electron and a hole among electronic transportation layers, this fluorochrome is subsequently heated and you

make it spread in said recombination field layer Since this layer is previously formed independently on the occasion of formation of a recombination field layer, the formation ingredient can be chosen without being restrained by the physical properties of a fluorochrome. Moreover, also about a fluorochrome, since you make it spread in this layer after the recombination field stratification, the thing of arbitration can be chosen, without being restrained by the physical properties of the formation ingredient of a recombination field layer.

[0020] Since two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome are used according to the manufacture approach of electroluminescence devices claim 2 and given in three, manufacture of the electroluminescence devices which emit light in two or more colors according to the luminescent color of a fluorochrome is attained.

[0021] In electroluminescence devices according to claim 4, since the layer used as the recombination field of an electron and a hole is made into the luminous layer a fluorochrome is made to come to spread, on the occasion of formation of this luminous layer, pattern processing of lithography, screen-stencil, etc. becomes unnecessary.

[0022] In electroluminescence devices according to claim 5, it is made to be spread by the field to which two or more sorts of fluorochromes which a luminous layer presents the different luminescent color became independent, respectively, and is formed, and since it comes to arrange the field which these-became independent corresponding to each crossover location of said matrix electrode, respectively, the display in two or more colors is attained by the drive of a matrix electrode. In electroluminescence devices according to claim 6, the layer used as a recombination field, i.e., a luminous layer, is made into polymer gel, and diffusion of a fluorochrome becomes easy in polymer gel. Moreover, in polymer gel, it becomes diffusion of ingredients other than a fluorochrome is also easy, and easy [installation of the dopant aiming at improvement in charge transportability, reduction of a hole or an electron injection obstruction, etc.]. In electroluminescence devices according to claim 7, the layer used as a recombination field, i.e., a luminous layer, is used as porosity silicon, and it is possible in the porosity silicon film making thickness and electronic physical properties homogeneity on the occasion of the formation, and equalization of the brightness in electroluminescence devices can be attained.

[0023]

[Example] Hereafter, this invention is explained in detail.

[0024] Drawing 1 and drawing 2 are drawings showing one example at the time of applying the electroluminescence devices according to claim 5 in this invention to the organic EL device for a color matrix display, and a sign 10 is an organic EL device in these drawings.

[0025] This organic EL device 10 forms transparent electrode 12 -- which consists of ITO etc. in the shape of a stripe on the transparence substrate 11, and is these transparent electrodes 12. -- Luminous layer 13 -- is formed in the shape of a dot upwards, the electronic transportation layer 14 is formed on this luminous layer 13, and further, on it, stripe-like metal-electrode 15 -- is formed, as it intersects perpendicularly with said transparent electrode 12 --. In addition, transparent electrode 12 -- and metal-electrode 15 -- cross at right angles mutually, and the matrix electrode is constituted by carrying out formation arrangement.

[0026] Here, luminous layer 13 -- distributes a fluorochrome (distributed coloring matter) by diffusion in this dispersion-medium film so that for example, the Pori N vinylcarbazole (PVCz) etc. may be used as the dispersion-medium film (dispersion-medium layer) which functions as a hole transportation layer and may be mentioned later. Moreover, in this example, as shown in drawing 1 and drawing 3 , it is cheated out of a different color in a luminous layer 13, and the fluorochrome which specifically presents red, green, and three sorts of blue luminescent color, respectively distribution (diffusion), and red light-emitting part 13a, green light-emitting part 13b, and blue light-emitting part 13c dissociate mutually by this, namely, it is formed independently into the luminous layer 13, respectively. In addition, as a fluorochrome, things, such as a coumarin system (green - yellow), a perylene system (red), an oxazole system (green - yellow), an oxazine system, a naphthalene

system (blue), and a quinolone system, are chosen suitably, and are used.

[0027] Moreover, the electronic transportation layer 14 consists for example, of an aluminum oxy-complex etc. In addition, as above-mentioned luminous layer (hole transportation layer) 13 --, the electronic transportation layer 14, or a both-sexes transportation layer, conductive polymer compounds other than **** can also be used. For example, polymer gel can be used as above-mentioned luminous layer 13 --, i.e., the above-mentioned recombination field layer. That is, polymer gel can be used as the dispersion-medium film (dispersion-medium layer) which functions as a hole transportation layer, and distribution of coloring matter becomes easy in this case as compared with the former (PVCz etc.). Furthermore, installation of the ingredient diffusion of those other than coloring matter of the dopant aiming at improvement in hole transportability, reduction of the hole impregnation obstruction from an anode, etc. since it becomes easy also becomes easy in this case. Therefore, it becomes improvable [a positive thin film property]. Moreover, as above-mentioned luminous layer 13 --, i.e., the above-mentioned recombination field layer, porosity silicon can be used, for example. That is, porosity silicon can be used as the dispersion-medium layer which functions as a hole transportation layer. this porosity silicon layer -- for example, an ITO electrode top -- CVD (chemical vapor deposition) -- the polish recon film deposited by law etc. is porosity-ized by anodic oxidation. Since this porosity silicon layer can acquire thickness and electronic physical properties as uniform film according to a dry process, it can realize equalization of brightness.

[0028] Moreover, metal-electrode 15 -- becomes a back plate, and is formed from the high metal of electron injection nature low [work functions, such as In, Mg, and calcium]. By forming metal-electrode 15 -- from such a metal, they are impregnation of the carrier (a hole, electron) from each electrode (transparent electrode 12 --, metal-electrode 15--), and a luminous layer 13. -- Recombination inside is performed efficiently and the electroluminescence devices 10 obtained as a result become what has the high luminescence engine performance.

[0029] In addition, each light-emitting parts 13a, 13b, and 13c in said luminous layer 13 -- were arranged corresponding to each crossover location of the matrix electrode which becomes said transparent electrode 12 -- from metal-electrode 15 --, respectively.

[0030] The electron poured in from a metal electrode 15 if it is in such an organic EL device 10 passes along the electronic transportation layer 14, and it is a luminous layer 13. -- Luminous layer 13 on which the hole which results inside and is poured in from a transparent electrode 12 on the other hand functions also as a hole transportation layer -- It results inside, and when an electron and a hole recombine within this luminous layer 13, light is emitted in the color according to the class of fluorochrome.

[0031] Here, the electronic physical properties of the thin film material which can serve as a device (ETL), i.e., an electronic transportation layer, for that hole transportation layer to turn into a luminous layer in this organic EL device 10 and a hole transportation layer (HTL) [a luminous layer] are explained using drawing 4 . Drawing 4 is the energy diagram of the carrier expressed in the form of the workload when setting the absolute value of ionization potential and an electron affinity to Ip and Ea, respectively, and pulling apart the concept of a work function (Wf), i.e., an electron, from restraint of the Coulomb force in each thin film layer in infinite distance. In addition, electronic potential becomes small inside an individual with more big Wf, and the potential of a hole becomes small inside an individual with more small Wf to this.

[0032] About electron injection, although Cathode (metal electrode 15) Wf and an energy barrier with the magnitude between ETL Ea exist, since this obstruction is fully small to external electric field, electron injection is performed easily. And the electron poured in into ETL moves to an interface with HTL by external electric field. Moreover, since electronic potential tends to become small more, migration of the electron from ETL to HTL advances spontaneously rather.

[0033] On the other hand, although Anode (transparent electrode 12) Wf and an energy barrier with the magnitude between HTL Ip exist, since this obstruction is also fully small to external electric field about hole impregnation, hole impregnation is performed easily. And it moves to an interface with ETL

by external electric field in the hole poured in into HTL. Moreover, to external electric field, since the energy barrier between ETL Ip and HTL Ip is very large, as for impregnation of the hole from HTL to ETL, it becomes difficulty.

[0034] For this reason, the hole poured in from the anode is confined in HTL, and an electron flows into HTL from ETL to this, therefore the recombination of a hole and an electron is produced in the ETL and HTL side of an HTL interface. although the energy of the exciton produced by recombination will change to HTL itself at this time if HTL is the single matter -- more -- fluorescence wavelength -- long -- and -- or when coloring matter with a big fluorescence yield lives together to this recombination part, energy transition is alternatively performed to that fluorochrome molecule, and a thin film makes luminescence resulting from the fluorescence of a fluorochrome molecule.

[0035] In addition, although drawing 4 showed the example as which this layer functions as a luminous layer when a hole transportation layer (HTL) turns into a recombination field layer, therefore a fluorochrome is made to live together in this layer An electronic transportation layer is used as a recombination field layer depending on selection of the thin film material which forms an electronic transportation layer (ETL) and a hole transportation layer (HTL). Therefore, it is also possible to make this layer into a luminous layer, and it is also possible to prepare a both-sexes transportation layer between an electronic transportation layer (ETL) and a hole transportation layer (HTL) further, to use this layer as a recombination field layer, and to make this both-sexes transportation layer into a luminous layer by this.

[0036] Next, the manufacture approach of such an organic electroluminescence light emitting device 10 is explained.

[0037] First, the transparence substrate 11 which formed transparent electrode film, such as ITO, beforehand by vacuum deposition, a spatter, etc. is prepared, and as the transparent electrode film is patternized in the shape of a stripe by etching etc. and shown in drawing 5 (a) and (b), transparent electrode 12 -- is formed on the transparence substrate 11.

[0038] Next, about the ingredient which forms hole transportation layers, such as the Pori N vinylcarbazole (PVCz), as shown in drawing 6 (a) and (b), it is said transparent electrode 12 by wet methods, such as a spin coat and a dipping coat, or vacuum deposition. -- Membranes are formed upwards and the hole transportation layer 16 is formed. It is the metal electrode 15 shown in drawing 2 here about membrane formation of the ingredient which forms this hole transportation layer 16. -- One intersection each is made into one unit (pixel), and by [of every inner 3 each and inner transparent electrode 12 --] forming membranes for every units of these, it carries out so that the whole may become dot-like. In addition, about drawing 5 (a), (b), drawing 6 (a), (b) and drawing 7 (a) which carries out a postscript and (b) - drawing 10 (a), and (b), the top view and sectional side elevation only about said unit (pixel) are shown.

[0039] Next, the fluorochrome B which presents the fluorochrome G which presents the fluorochrome R which presents red luminescence on the hole transportation layer 16 formed by doing in this way as shown in drawing 7 (a) and (b), and green luminescence, and blue luminescence is mutually separated by screen printing or the ink jet method, respectively, and spreading expansion is made and carried out.

[0040] Subsequently, by irradiating infrared radiation at the side which developed said fluorochromes R, G, and B using the infrared lamp 17, and heating these fluorochromes R, G, and B and the hole transportation layer 16, as shown in drawing 8 (a) and (b) A luminous layer 13 is formed at the same time it forms red light-emitting part 13a, green light-emitting part 13b, and blue light-emitting part 13c by making these fluorochromes R, G, and B diffuse in the hole transportation layer 16.

[0041] In addition, about heating diffusion of a fluorochrome, you may heat [side / transparence substrate 11] from the side which developed this fluorochrome, and may heat by heat conduction using heaters, such as a hot plate instead of infrared heating, in that case. Thus, if it heats from the transparence substrate 11 side, the coloring matter loss to which the fluorochrome which used the expansion side of a fluorochrome since temperature became low from the transparence substrate 11 originated in sublimation when sublimability was high can

be reduced.
[0042] Moreover, you may develop with the shape of a solid-state, it may be made to dissolve in a proper solvent, and you may make it develop by the shape of a solution about expansion of Fluorochromes R, G, and B.
[0043] Subsequently, the ingredient which forms electronic transportation layers, such as an aluminum oxy-complex, is formed on a luminous layer 13 with vacuum deposition etc., as shown in drawing 9 (a) and (b), and the electronic transportation layer 13 is formed.
[0044] Then, it intersects perpendicularly with transparent electrode 12 --, and it is made to correspond to each, metal-electrode 15 -- is formed in right above [of these] by a spatter etc., and each red light-emitting part 13a-- of a luminous layer 13, green light-emitting part 13b--, and the organic EL device 10 of blue light-emitting part 13c-- shown in drawing 1 and drawing 2 are obtained.
[0045] Since Fluorochromes R, G, and B are developed, and this is heated further, it is spread in the hole transportation layer 16 and a luminous layer 13 is formed on it after forming previously the hole transportation layer 16 used as a recombination field layer, if it is in such a manufacture approach The ingredient which forms the hole transportation layer 16 can be chosen without being restrained by the physical properties of Fluorochromes R, G, and B. Also about Fluorochromes R, G, and B Since you make it spread in this layer after hole transportation layer (recombination field layer) 16 formation, the thing of arbitration can be chosen without receiving constraint in the physical properties of the formation ingredient of the hole transportation layer 16.
[0046] Moreover, if it was in the organic EL device obtained by doing in this way, since pattern processing of lithography, screen-stencil, etc. was not used for formation of a luminous layer 13, the manufacturing cost was also reduction-ized, while the manufacture became easy, therefore the yield increased.
[0047] Moreover, it has red light-emitting part 13a which the luminous layer 13 was made to be spread by the field which became independent, respectively, and was formed, green light-emitting part 13b, and blue light-emitting part 13c, and each [these] light-emitting part is [-- (matrix electrode) A full color display is attained by drive.] a transparent electrode 12, respectively. -- Metal electrode 15 -- Since it is arranged corresponding to the crossover location, they are these transparent electrodes 12. -- Metal electrode 15
[0048] In addition, although said example explained by the case where coincidence is made to heat and diffuse these fluorochromes R, G, and B after carrying out spreading expansion of the fluorochromes R, G, and B, respectively, this invention is not restricted to this approach. For example, after dried this, having carried out spreading expansion of the fluorochrome G subsequently, drying this, carrying out [having carried out spreading expansion of the fluorochrome R,] spreading expansion of the fluorochrome B after that and drying this, each fluorochrome of RGB may be diffused in a recombination field layer in coincidence with heating mentioned above. Moreover, the process of spreading expansion and heating diffusion may be made to repeat for every fluorochrome, as spreading expansion of the fluorochrome R is carried out, carry out heating diffusion of this, subsequently carry out spreading expansion in Fluorochrome G, heating diffusion is carried out in this, spreading expansion is carried out in Fluorochrome B after that and this was said as carrying out heating diffusion.
[0049] Moreover, although each light-emitting part was formed in the luminous layer 13 using three sorts of things which emit light in red, green, and blue as a fluorochrome, only any one sort or two sorts of fluorochromes may be used, and the fluorochrome which emits light in colors other than the further aforementioned color may be used. Moreover, although the luminous layer 13 was formed in the shape of a dot in said example, each light-emitting parts 13a, 13b, and 13c may be formed in the shape of a stripe, or the luminous layer 13 whole may be formed in the shape of [two or more] a stripe.
[0050] Furthermore, although it diffused the fluorochrome in this hole transportation layer as the hole transportation layer 16 became a recombination field, and it considered as the luminous layer 13 in said example An electronic transportation layer is used as a recombination field layer depending on selection of the thin film material which forms

an electronic transportation layer and a hole transportation layer as mentioned above. Therefore, this layer can also be made into a luminous layer, a both-sexes transportation layer can be further prepared between an electronic transportation layer and a hole transportation layer, this layer can be used as a recombination field layer, and, thereby, this both-sexes transportation layer can also be made into a luminous layer.

[0051]

[Effect of the Invention] As explained above, the manufacture approach of the electroluminescence devices according to claim 1 in this invention Spreading expansion of the fluorochrome is carried out on this recombination field layer after formation of a recombination field layer and the becoming layer. Subsequently, since this fluorochrome is heated and you make it spread in said recombination field layer, it can choose on the occasion of formation of a recombination field layer, without the physical properties of a fluorochrome restraining the formation ingredient by forming this layer independently previously. Moreover, also about a fluorochrome, since you make it spread in this layer after the recombination field stratification, the thing of arbitration can be chosen, without being restrained by the physical properties of the formation ingredient of a recombination field layer. Therefore, when the degree of freedom on ingredient selection increases, the manufacture condition is eased and, thereby, productivity can be raised.

[0052] Since the manufacture approach of electroluminescence devices claim 2 and given in three uses two or more sorts of fluorochromes which present the different luminescent color as said fluorochrome, it can manufacture the electroluminescence devices which emit light in two or more colors according to the luminescent color of a fluorochrome.

[0053] Since electroluminescence devices according to claim 4 were made into the luminous layer a fluorochrome is made to come to spread the layer used as the recombination field of an electron and a hole, the manufacturing cost was also reduction-ized, while the manufacture became easy, therefore the yield increased, since pattern processing of lithography, screen-stencil, etc. became unnecessary on the occasion of formation of this luminous layer.

[0054] It is made to diffuse electroluminescence devices according to claim 5 by the field to which two or more sorts of fluorochromes which a luminous layer presents the different luminescent color became independent, respectively, and they are formed, and since the field which these-became independent is arranged corresponding to each crossover location of said matrix electrode, respectively, they can perform the display in two or more colors by the drive of a matrix electrode.

[0055] Electroluminescence devices according to claim 6 can make distribution of a fluorochrome easy by having made the recombination field layer used as a luminous layer into polymer gel. Furthermore, polymer gel becomes easy [installation of the ingredient diffusion of those other than coloring matter of the dopant aiming at improvement in hole transportability, reduction of the hole impregnation obstruction from an anode, etc. since it becomes easy]. Therefore, it becomes improvable [the positive thin film property by installation of a dopant].

[0056] The recombination field layer from which electroluminescence devices according to claim 7 serve as a luminous layer is able for the porosity silicon film to porosity-ize the polish recon film deposited with the CVD method etc. for example, on the ITO electrode by anodic oxidation by considering as porosity silicon, and to obtain as film with homogeneous thickness and electronic physical properties according to the dry process. Therefore, equalization of brightness is realizable by using porosity silicon as a luminous layer.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The important section sectional view showing one example at the time of applying the electroluminescence devices of this invention to an organic EL device.

[Drawing 2] The top view of the organic EL device shown in drawing 1 .

[Drawing 3] The top view of a luminous layer.

[Drawing 4] Drawing showing the energy diagram of a carrier.

[Drawing 5] It is drawing for explaining the

manufacture approach of the organic EL device shown in drawing 1 , and for (a), it is an important section top view and (b) is an important section sectional side elevation.

[Drawing 6] It is drawing for explaining the following process shown in drawing 5 , and for (a), it is an important section top view and (b) is an important section sectional side elevation.

[Drawing 7] It is drawing for explaining the following process shown in drawing 6 , and for (a), it is an important section top view and (b) is an important section sectional side elevation.

[Drawing 8] It is drawing for explaining the following process shown in drawing 7 , and for (a), it is an important section top view and (b) is an important section sectional side elevation.

[Drawing 9] It is drawing for explaining the following process shown in drawing 8 , and for (a), it is an important section top view and (b) is an important section sectional side elevation.

[Drawing 10] The important section perspective view showing an example of the conventional electrolytic luminescence component.

[Description of Notations]

10 Organic EL Device (Electroluminescence Devices)
11 Transparence Substrate
12 Transparent Electrode
13 Luminous Layer
13a Red light-emitting part
13b Green light-emitting part
13c Blue light-emitting part
14 Electronic Transportation Layer
15 Metal Electrode (Back Plate)
16 Hole Transportation Layer
17 Infrared Lamp
R, G, B Fluorochrome